Acinetobacter Species Infections among Navy and Marine Corps Beneficiaries: 2012 Annual Report

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14. ABSTRACT

The EpiData Center Department (EDC) at the Navy and Marine Corps Public Health Center (NMCPHC) conducts routine surveillance of clinically significant organisms within the Department of the Navy (DON) as well as the Department of Defense (DOD). This report provides a summary of Acinetobacter species isolates in calendar year (CY) 2012 and describes the demographics, clinical characteristics, prescription practices, and antibiotic resistance patterns observed among all DOD beneficiaries as well as active duty DON service members and recruits. Acinetobacter species are associated with a large number of infections, have the ability to easily acquire resistance determinants, and quickly develop resistance to multiple antibiotics, leaving few, if any, treatment options. In calendar year (CY) 2012, the overall Acinetobacter infection rate was 5.3 per 100,000 beneficiaries in the Department of the Navy (DON) and 4.8 per 100,000 beneficiaries in the Department of Defense (DOD); both rates decreased from previous years. Acinetobacter among DON beneficiaries was most frequently identified in the outpatient setting (76.7%), from non-sterile body sites (61.3%), and among 18-24 year olds (36.0%). The most common species identified was A. baumannii (42.7%). For MDR/XDR cases, providers most commonly prescribed vancomycin, meropenem, or doxycycline. Cases with susceptibility testing results showed that, among DON beneficiaries, organisms were

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Abstract

Acinetobacter species are associated with a large number of infections, have the ability to easily acquire resistance determinants, and quickly develop resistance to multiple antibiotics, leaving few, if any, treatment options. In calendar year (CY) 2012, the overall *Acinetobacter* infection rate was 5.3 per 100,000 beneficiaries in the Department of the Navy (DON) and 4.8 per 100,000 beneficiaries in the Department of Defense (DOD); both rates decreased from previous years. *Acinetobacter* among DON beneficiaries was most frequently identified in the outpatient setting (76.7%), from non-sterile body sites (61.3%), and among 18-24 year olds (36.0%). The most common species identified was *A. baumannii* (42.7%). Multidrug-resistant (MDR) organisms accounted for 9.3% of DON cases and extensively drug-resistant (XDR) organisms accounted for 1.3% of DON cases. For non-MDR cases in the DON, providers most commonly prescribed trimethoprim/sulfamethoxazole, followed by ofloxacin. For MDR/XDR cases, providers most commonly prescribed vancomycin, meropenem, or doxycycline. Cases with susceptibility testing results showed that, among DON beneficiaries, organisms were most susceptible to gentamicin (92.4%), followed by imipenem (91.2%), and levofloxacin (90.0%); organisms were least susceptible to ampicillin (7.0%). Surveillance of *Acinetobacter* cases will continue along with quarterly and annual reports to monitor trends and burden in the DON and DOD.

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Executive Summary

The EpiData Center Department (EDC) at the Navy and Marine Corps Public Health Center (NMCPHC) conducts routine surveillance of clinically significant organisms within the Department of the Navy (DON) as well as the Department of Defense (DOD). This report provides a summary of *Acinetobacter* species isolates in calendar year (CY) 2012 and describes the demographics, clinical characteristics, prescription practices, and antibiotic resistance patterns observed among all DOD beneficiaries as well as active duty DON service members and recruits.

Linking several data sources in this report allows for the assessment of a variety of unique descriptive and clinical factors related to *Acinetobacter* within multiple populations. Health Level 7 (HL7) formatted microbiology data were used to identify *Acinetobacter* isolates. These isolates were then matched to four databases. Microbiology records were matched to HL7 pharmacy data to assess prescribing practices associated with *Acinetobacter*. Isolates were also matched to the Standard Inpatient Data Record (SIDR) and the Comprehensive Ambulatory Patient Encounter Record (CAPER) databases to determine exposure associations within the healthcare system as well as injuries incurred that are related to the identification of the organism. Microbiology records were also matched to the Defense Manpower Data Center (DMDC) active duty roster in order to determine incidence of *Acinetobacter* among active duty DON service members and recruits. The linking of these databases allows for the broadest view of *Acinetobacter* among DOD beneficiaries seeking care within the Military Health System (MHS).

This report is a summary of *Acinetobacter* infections identified within the MHS in CY 2012 to help infection preventionists and infectious disease practitioners make informed decisions on the treatment of *Acinetobacter* infections. In addition, this report monitors antibiotic resistance in this organism. Understanding the current disease dynamics will help ensure military health providers have the best information possible, thus ensuring quality care and mission readiness.

Introduction

Acinetobacter species are gram-negative bacteria of increasing importance since the early 2000s. The most clinically important species is *A. baumannii*, which is associated with a large number of infections and demonstrates an ability to acquire resistance.[1,2] Using normal phenotypic tests, several other *Acinetobacter* species are difficult to distinguish from *A. baumannii*, namely *A. calcoaceticus*, *Acinetobacter* genomic species 3, and *Acinetobacter* genomic species 13TU. Because genetic testing is not always practical, experts commonly refer to these four species as the *A. baumannii-calcoaceticus* complex, or ABC.[1-4]

Geographic distribution contributes to the growing concern surrounding *Acinetobacter*. The ease and frequency of human travel around the world creates a greater risk for acquisition and transmission of novel infections and/or novel resistance strains between not only bordering countries, but also geographically distinct countries.[5] Multiple European, North American, and Asian hospitals have reported endemic levels of *Acinetobacter* isolates displaying multidrug resistance, as have hospitals in Argentina, Brazil, some South Pacific Island nations, and the Middle East.[5]

There are also climatic factors that place certain geographic areas at higher risk than others for acquiring *Acinetobacter* in the community and hospital.[3] *Acinetobacter* species are hydrophilic and thrive best in hot and humid environments,[3] thus causing infections to peak in summer and fall months. Though heating, ventilation, and air conditioning keep indoor temperatures relatively stable, changes in outdoor humidity can alter moisture levels within buildings, thus allowing for seasonal variation of *Acinetobacter* infections within the hospital environment.[6]

Multidrug-resistant *Acinetobacter* species infections are of particular importance to military clinicians as they occur with greater frequency in service members injured in Middle Eastern countries compared to their counterparts stationed in the United States (US).[5,7-13] Antibiotic-resistant *Acinetobacter* infections, most often ABC, are frequently isolated from US service members wounded during combat in support of Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF).[9] Clinicians estimated that combat injury *Acinetobacter* infections have a 30% mortality rate.[5] Furthermore, isolates identified from returning service members were significantly more drug resistant than isolates commonly found in the US, including those found in non-deployed service members.[10,11] In 2006, Hujer et al. found that 89% of service members evacuated from Iraq and Afghanistan had isolates resistant to at least three different antimicrobial classes.[11]

Acinetobacter is adept at responding to antimicrobial pressure and develops resistance more quickly than most bacteria. It also develops resistance to all currently available antibiotics.[14] Historically, categorization of drug resistance in bacteria was challenging because of a lack of standard definitions. In recent years, however, international experts established consistent definitions and categorized bacterial resistance into three groups: multidrug-resistant (MDR), extensively drug-resistant (XDR), and pandrug-resistant (PDR).[14] Refer to the Appendix (Table A1) for group definitions as well as antibiotic categories specific to *Acinetobacter*.

Methods

Study Design, Setting, and Population

This annual report is a retrospective surveillance summary for calendar year (CY) 2012. The EpiData Center (EDC) conducted surveillance on all outpatient and inpatient isolates as determined by the Medical Expense and Performance Reporting System (MEPRS) codes in microbiology data. For Department of Defense (DOD) beneficiaries who sought care within the Military Health System (MHS), a MEPRS code of 'A' indicated isolate collection in the inpatient setting. All other MEPRS codes were considered outpatient cases. This report also includes sub-analyses of Department of the Navy (DON) active duty service members and recruits. All unique *Acinetobacter* species isolates occurring at least 30 days apart were considered individual cases.

Data Collection, Processing, and Analysis

Health Level 7 (HL7) microbiology data that originated from the Composite Health Care System (CHCS) at fixed military treatment facilities (MTFs) were used to identify *Acinetobacter* cases. The EDC receives data from the Defense Health Surveillance System within approximately two days of record generation. The data contain information for DOD beneficiaries who sought care (both inpatient and outpatient) at a fixed MTF. Data do not include records from purchased care, shipboard, battalion aid stations, or in-theater facilities. Surveillance cultures, defined as specimens isolated from nares, axilla, and groin, were excluded from consideration in this analysis, as surveillance cultures are typically indicative of colonization and not true infection. The EDC utilized the World Health Organization's (WHO) BacLink and WHONET applications to organize antibiotic susceptibilities within microbiology records. Microbiology data were used to identify beneficiary service (Air Force, Army, Marine Corps, or Navy), setting of specimen collection (inpatient or outpatient), beneficiary gender, and beneficiary status (active duty, family member, retired, or other).

The EDC linked inpatient, outpatient, and active duty data for the identified cases using the Standard Inpatient Data Record (SIDR) database, the Comprehensive Ambulatory Professional Encounter Record (CAPER) database, and the Defense Manpower Data Center (DMDC) active duty roster. SIDRs were matched to microbiology records based on the HL7 specimen collection date occurring between the SIDR admission date and up to seven days following the SIDR discharge date. DON active duty cases were identified by matching the microbiology cases to the DMDC active duty roster for CY 2012 using a unique identifier. All DON service member cases matching the roster were included. DON recruits were also identified using the DMDC active duty roster when the start of federal service date occurred during CY 2012. This analysis estimates the end of recruit training for each service member by calculating the date for the end of the training period from the start of federal service date (9 weeks for Naval recruits and 13 weeks for Marine recruits). If a microbiology record was identified for a recruit between the start of federal service date and seven days after the estimated end of basic training date, then the service member was counted as a recruit case.

To evaluate laboratory-confirmed *Acinetobacter* cases for recent healthcare exposure, the organism identification date was linked to the hospital admission date in SIDR. Hospital-onset (HO) cases were defined as *Acinetobacter* positive specimens collected after the third day of the current admission. Healthcare-associated (HA) cases were defined as those who had a current admission with *Acinetobacter* and a prior hospitalization within the previous year. Community-onset (CO) cases were defined as those *Acinetobacter* positive specimens collected within the first three days of admission, indicating the patient acquired the organism within the community and likely arrived at the treating facility with it.[15]

SIDR and CAPER databases were used to identify injuries associated with *Acinetobacter* cases using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes present in the record. To associate an HL7 record with CAPER, the CAPER encounter date had to occur within seven days of the HL7 specimen collection date. The CAPER database was used to identify any other injuries among beneficiaries who did not have a SIDR to compile the full range of injuries associated with *Acinetobacter* cases. If a case matched to both SIDR and CAPER, only the SIDR record was retained to avoid overestimation of injury numbers. The Barell matrix, a standardized tool for classifying injury type by anatomic location using ICD-9-CM diagnosis codes, was used for the injury related analysis.[16,17] Cases cannot be routinely linked to specific injury sites using these data because of non-descriptive specimen sources from the microbiology record. Therefore, injury counts for each case reflect all injuries from the encounter.

Demographic and clinical information for the specimen were described for each case using information within the HL7 microbiology record. Specimen sources of *Acinetobacter* species cases were categorized based on the specimen source or body site. Blood, cerebrospinal fluid, pleural fluid, pericardial fluid, peritoneal fluid, synovial fluid, and bone were considered sterile sources. Skin and soft tissue infections (SSTIs) were defined as specimen sources of: wound, abscess, skin, lesion, pustule, cellulitis, boil, pus, carbuncle, cyst, drainage, discharge, and exudates. All other sources were classified as non-sterile.

The EDC created an antibiogram for *Acinetobacter* species identified in 2012 using antibiotic susceptibility testing results within the HL7 microbiology record according to the Clinical and Laboratory Standards Institute (CLSI) guidelines, which include a single isolate per person per year.[18] The EDC selected antibiotics for the antibiogram based on a 2007 report on *A. baumannii* antibiograms[19] and consultation with a subject matter expert.

Susceptibility results from the microbiology record were used to establish the level of drug resistance among cases. Isolates non-susceptible (resistant or intermediately susceptible) to at least one antibiotic in three different classes were considered MDR. The antibiotic classes involved in this classification include select penicillins, cephalosporins, fluoroquinolones, and aminoglycosides. Organisms non-susceptible to at least one antibiotic in all but one or two classes were considered XDR. Finally, PDR organisms are organisms that are non-susceptible to at least one antibiotic in all antibiotic classes.[2,4,14] For the remainder of this report, unless otherwise stated, resistant and resistance are defined as *Acinetobacter* cases displaying any level

of resistance, whether it be MDR, XDR, or PDR. See the Appendix (Table A1) for a list of antibiotics used to identify the level of resistance among cases.

HL7 pharmacy records were used to identify antibiotic prescriptions associated with *Acinetobacter* cases. HL7 pharmacy data consist of three distinct sources depending on the location where a provider prescribed medication and the route by which the medication was to be administered. The sources include outpatient oral, inpatient oral, and intravenous (IV) prescription records. For this analysis, prescriptions associated with an *Acinetobacter* case were identified as those with a pharmacy transaction date within seven days of the HL7 microbiology specimen collection date.

To describe geographic trends of *Acinetobacter* within the continental US (CONUS), a geographic information system (GIS) map was used to display the overall prevalence of *Acinetobacter* as compared to CONUS climate regions. Organisms identified in each region act as a reservoir within that region and contribute to the overall burden of exposure. The US postal ZIP code of the requesting Defense Medical Information System (DMIS) identification (ID) number in the microbiology record was used to establish the geographic location of the MTF where a case originated. Isolates were categorized into one of two groups: isolates from MTFs within the CONUS or isolates from MTFs outside the continental US (OCONUS). The CONUS infection rates and the percent change in infection rates from the historic mean rate for CY 2012 were mapped by climatic region based on the aforementioned postal ZIP code of the requesting DMIS ID. To define climate regions, the EDC used the US Department of Energy (DOE) Guide to Determining Climate Regions by County, 2010.[20] CONUS states were assigned to one of the following climatic regions based on the average temperature and rainfall/humidity predominantly experienced by the state as measured by the DOE: hot-dry, hot-humid, mixed-humid, cold, and subarctic. To calculate rates based on available denominator data, states that intersected more than one climatic region were grouped into the region of the predominate climate experienced in that state. For more detail on the definition of climate zones, please refer to the aforementioned DOE climate guide. Climatic region infection rates for 2012 were calculated as the number of cases identified in each climatic region per the total MHS Mart (M2) beneficiary counts of all states within the climatic region. Because beneficiary counts fluctuate on a monthly basis, the EDC followed the recommendation of subject matter experts and used the beneficiary count from July of each year as an estimate for the entire year.

To provide context for annual rates, a historic mean rate was calculated for each region as the cumulative case count per average M2 beneficiary count for each climatic region from 2008-2011. The 2012 infection rate was compared to the historic mean infection rate by calculating the percent change for each climatic region to identify the magnitude of the changes in the infection rates. The percent change from the historic mean was determined as the difference between the 2012 rate and the historic mean rate divided by the historic mean rate. Refer to the Appendix (Figure A1) for a map displaying the overall distribution of *Acinetobacter* cases across the US using the same geographic location methodology mentioned above. Each individual's beneficiary service branch was identified as previously described and displayed in the map by state based on the location of the MTF requesting the test. Resistant isolates were included as a

percentage of all isolates occurring within a state.

Monthly and annual infection rates were calculated using M2 beneficiary counts to obtain counts of TRICARE eligible beneficiaries by demographic category. Beneficiary counts were retrieved on a monthly basis for the monthly rate denominators. The annual rates from 2005-2012 were analyzed to determine whether a monotonic trend in infection rates was observed using the Spearman rank correlation (coefficient ρ) test.

To provide context for 2012 infection rates, the EDC calculated historic mean incidence rates from 2008-2011 for eligible DOD beneficiaries and DON active duty service members. For the monthly rates, a quarterly historic mean was used to provide a seasonality context. The quarterly rates were calculated as the cumulative case counts for the three months of each quarter in each year from 2008-2011 using the M2 beneficiary counts for each quarter from 2008-2011 for eligible DOD beneficiaries. The annual historic mean was calculated as the cumulative case count using M2 beneficiary counts from 2008-2011. The 2008-2011timeframe was selected for the historic mean because it represents the most stable years of *Acinetobacter* infection and factors that impact acquisition in the DON and DOD.

Results

DON/DOD

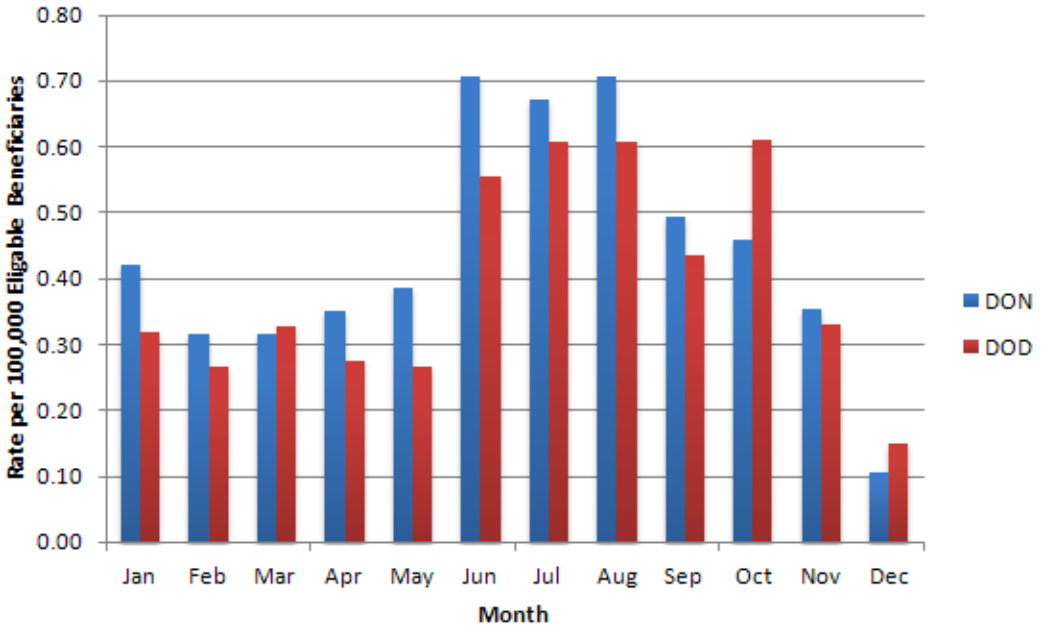
During 2012, *Acinetobacter* infection rates in the DON and DOD were far below the historic mean rate for each quarter (Q). Additionally, the quarterly rates reflect seasonal fluctuations with higher rates in quarters two and three (Table 1). Figure 1 presents the monthly infection rates for the DON and DOD beneficiary populations. The highest infection rates for both the DON and DOD occurred in the months of June through October, mirroring the quarterly rates in Table 1.

Table 1. Quarterly CY 2012 Rates for DON and DOD *Acinetobacter* Infections and Historic Mean Rate per 100,000 Beneficiaries

Quarter	DON 2012	DOD 2012	DOD Mean[a]
1	0.35	0.30	2.26
2	0.48	0.36	2.92
3	0.62	0.55	3.48
4	0.31	0.36	2.59

[a] Mean calculated as an average rate for DOD *Acinetobacter* infections from 2005-2011 by quarter.
Data are from the HL7 microbiology and M2 databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 18 September 2013.

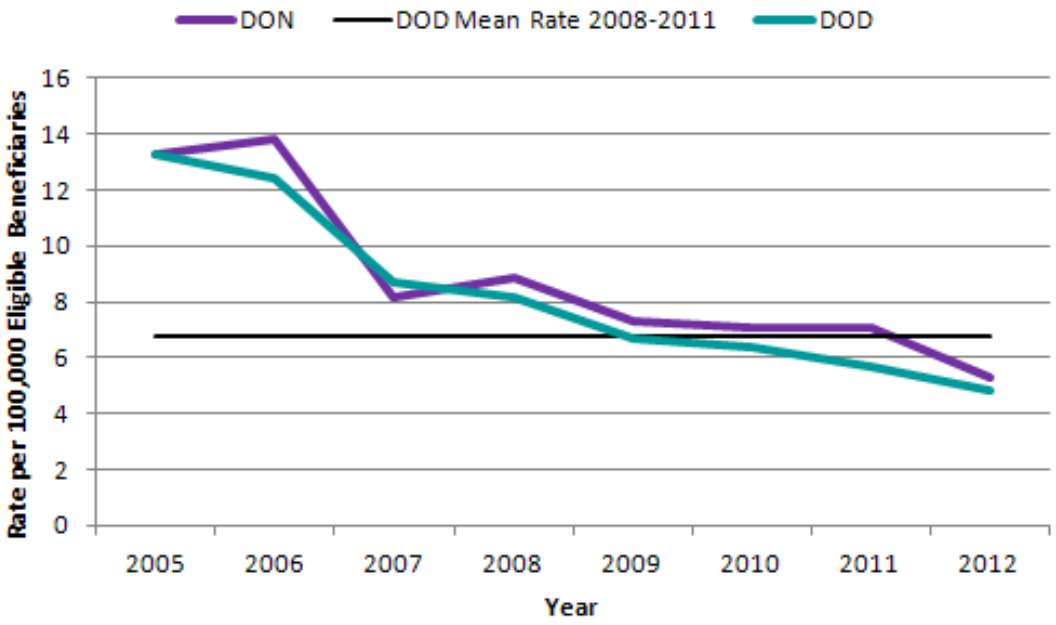
Figure 1. *Acinetobacter* Species Infection Incident Rate in Eligible DON and DOD Beneficiaries by Month, 2012



Data are from the HL7 microbiology and M2 databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 08 May 2013.

Figure 2 displays the DON and DOD annual historical trends from 2005-2012. The overall incidence of *Acinetobacter* infections from 2005-2012 continued to decline with strong descending monotonic trends in both the DON (ρ = -0.94) and DOD (ρ = -1.00). The DON and DOD rates for 2012 (5.3 and 4.8 per 100,000 eligible beneficiaries, respectively) were below the historic mean rate (6.7 per 100,000 eligible beneficiaries) and are the lowest rates in both populations since enterprise-wide surveillance began in 2005.

Figure 2. *Acinetobacter* Species Infection Incident Rates among DON and DOD Beneficiaries, 2005-2012, with Historic Mean Rate



Data are from the HL7 microbiology and M2 databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 18 September 2013.

Table 2 presents the demographics and infection rates for DON and DOD *Acinetobacter* cases. The EDC identified 150 *Acinetobacter* cases among 148 DON beneficiaries and 446 *Acinetobacter* cases among 417 DOD beneficiaries. For both the DON and DOD, the highest rates occurred in men, beneficiaries between the ages of 18 and 24, active duty service members, and OCONUS beneficiaries. The beneficiary service branch with the highest *Acinetobacter* infection rate was the Marine Corps (8.9 per 100,000 beneficiaries).

Table 2. Demographics of *Acinetobacter* Infections in the DON and DOD, CY 2012

DON			DOD		
N = 150	Count	Rate[a]	N = 446	Count	Rate[a]
Gender			**Gender**		
Female	49	3.6	Female	166	3.6
Male	101	6.8	Male	280	5.8
Age Group			**Age Group**		
0-17 years	25	4.3	0-17 years	89	4.5
18-24 years	54	12.4	18-24 years	119	9.8
25-34 years	28	7.8	25-34 years	74	6.2
35-44 years	11	4.4	35-44 years	31	3.7
45-64 years	13	2.0	45-64 years	64	3.0
65+ years	19	3.4	65+ years	69	3.4
Sponsor Service			**Sponsor Service**		
			Air Force	89	3.4
			Army	207	5.2
Marine Corps	68	8.9	Marine Corps	68	8.9
Navy	82	4.0	Navy	82	4.0
Beneficiary Type			**Beneficiary Type**		
Active duty	79	15.1	Active duty	180	12.7
Family member	51	3.3	Family member	193	3.9
Retired	19	3.0	Retired	65	3.1
Other	1	0.9	Other	8	0.9
Location			**Location**		
CONUS	138	5.2	CONUS	370	4.2
OCONUS	12	12.1	OCONUS	68	17.4
Unknown[b]	0		Unknown[b]	8	

[a] Rates per 100,000 eligible beneficiaries.
[b] TRICARE service region cannot be identified from the microbiology record.
Data are from the HL7 microbiology and M2 databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

Table 3 displays the clinical characteristics of the *Acinetobacter* cases in the DON and DOD. Clinicians most commonly collected isolates in the outpatient setting and from non-sterile body sites. The most common causative agent of *Acinetobacter* cases was *A. baumannii* in the DON (42.7%) and ABC in the DOD (38.8%). In the DON, 9.3% of *Acinetobacter* isolates were MDR and 1.3% were XDR. In the DOD, 12.3% of cases were MDR and 0.9% were XDR. Of the 148 unique DON beneficiaries, 2 beneficiaries had 2 laboratory-confirmed *Acinetobacter* cases, all of which were MDR cases (data not shown). Fifteen people accounted for 29 *Acinetobacter* cases in the DOD; 14 of the 29 cases were MDR, 1 case was XDR, and the remaining 14 cases did not exhibit any level of resistance (MDR, XDR, or PDR) (data not shown).

Thirty-five DON beneficiaries were hospitalized with *Acinetobacter* in 2012. Thirteen (37.1%) of the hospitalizations were HA cases and 2 (5.7%) were HO cases. The remaining 20 hospitalizations (57.1%) were CO cases. Ninety-eight DOD beneficiaries were hospitalized with *Acinetobacter* in 2012. Thirty-eight (38.8%) of these 98 hospitalizations were HA cases and 10 (10.2%) were HO cases. The remaining 50 hospitalizations (51.0%) were CO cases.

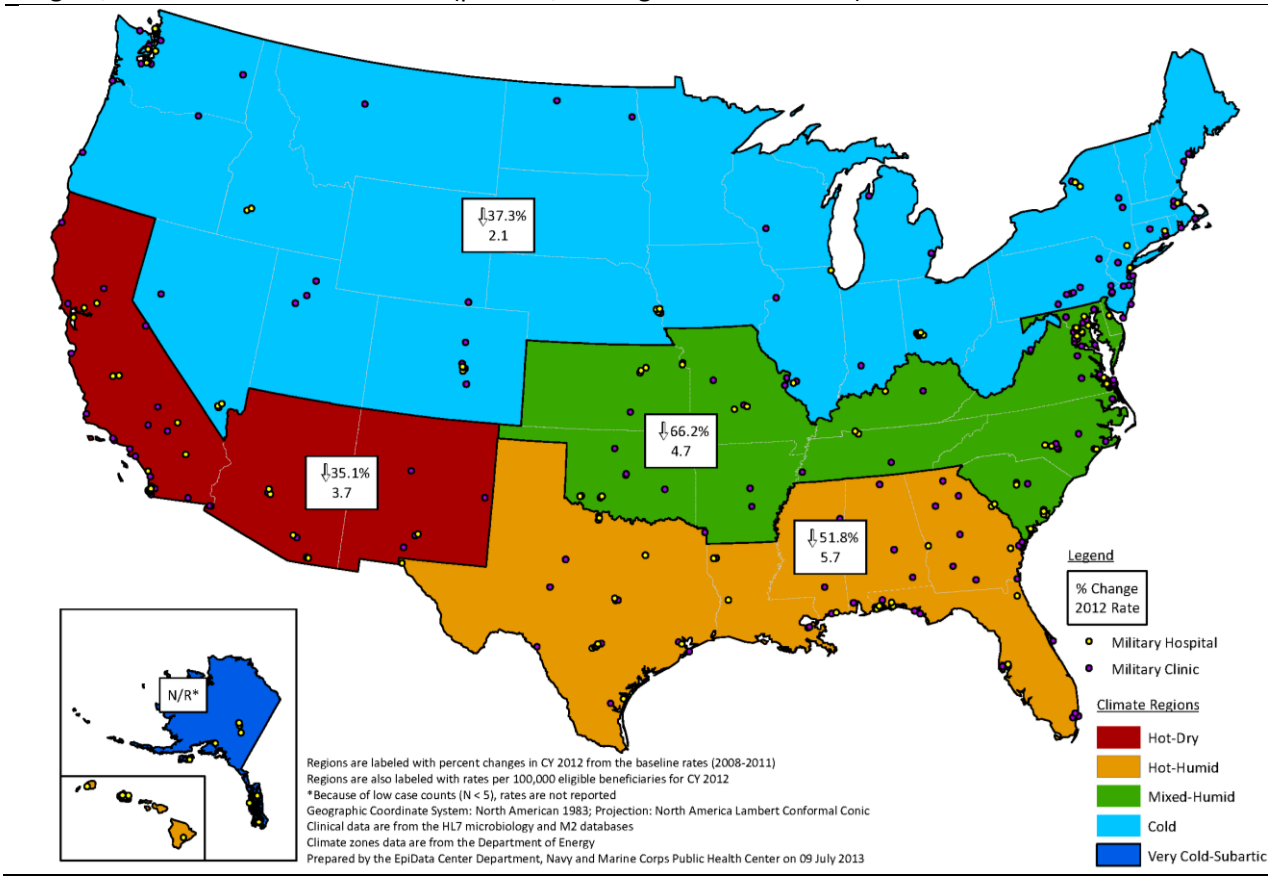
Table 3. Clinical Description of *Acinetobacter* Species Infections in the DON and DOD, CY 2012

DON			DOD		
N = 150	**Count**	**Percent**	**N = 446**	**Count**	**Percent**
Encounter Type			**Encounter Type**		
Inpatient	35	23.3%	Inpatient	98	22.0%
Outpatient	115	76.7%	Outpatient	348	78.0%
Healthcare/Community Associated[a]			**Healthcare/Community Associated[b]**		
Hospital onset (HO)	2	5.7%	Hospital onset (HO)	10	10.2%
Healthcare associated (HA)	13	37.1%	Healthcare associated (HA)	38	38.8%
Community onset (CO)	20	57.1%	Community onset (CO)	50	51.0%
Infection Type			**Infection Type**		
Skin and soft tissue infections (SSTI)	54	36.0%	Skin and soft tissue infections (SSTI)	184	41.3%
Sterile	4	2.7%	Sterile	16	3.6%
Non-sterile	92	61.3%	Non-sterile	246	55.2%
Species			**Species**		
A. baumannii	64	42.7%	*A. baumannii*	129	28.9%
A. calcoaceticus-baumannii complex	33	22.0%	*A. calcoaceticus-baumannii* complex	173	38.8%
A. radioresistens	26	17.3%	*A. radioresistens*	77	17.3%
A. lwoffii	19	12.7%	*A. lwoffii*	52	11.7%
A. calcoaceticus	7	4.7%	*A. calcoaceticus*	10	2.2%
A. hemolyticus	1	0.7%	*A. hemolyticus*	2	0.4%
A. junii	0	--	*A. junii*	2	0.4%
A. johnsonii	0	--	*A. johnsonii*	1	0.2%
A. anitratus	0	--	*A. anitratus*	0	--
Antibiotic Resistance			**Antibiotic Resistance**		
Multidrug (MDR)	14	9.3%	Multidrug (MDR)	55	12.3%
Extensively drug (XDR)	2	1.3%	Extensively drug (XDR)	4	0.9%
Pandrug (PDR)	0	--	Pandrug (PDR)	0	--
None[c]	134	89.3%	None[c]	387	86.8%

[a] Percentage per number of DON hospitalizations (N = 35).
[b] Percentage per number of DOD hospitalizations (N = 98).
[c] No level of multidrug-resistance (MDR, XDR, or PDR) was detected.
Data are from the HL7 microbiology, SIDR, and M2 databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

The EDC compared the rates of *Acinetobacter* cases identified in 2012 to the historic mean (2008-2011) rate according to climatic region. Climate regions with the highest risk for *Acinetobacter* acquisition (hot-humid and mixed-humid environments) experienced greater case reductions than the other climate regions. The highest incidence rates occurred in humid climate regions of the US (Figure 3). A map displaying the distribution of *Acinetobacter* cases in DOD beneficiaries in the US and percentage of resistance is included in the Appendix (Figure A1).

Figure 3. Percent Change of *Acinetobacter* Incidence in CY 2012 from the Mean Rate (2008-2012), by Region, and CY 2012 Incidence Rate (per 100,000 Eligible Beneficiaries)



Regardless of the route of administration, trimethoprim/sulfamethoxazole was the most commonly prescribed antibiotic in the DON for *Acinetobacter* cases that were not resistant; ofloxacin was the second-most commonly prescribed antibiotic. Trimethoprim/sulfamethoxazole was the most commonly prescribed oral antibiotic and vancomycin was the most commonly prescribed IV antibiotic. A list of the most common DON prescriptions for *Acinetobacter* cases is included in Table 4. Regardless of administration route, vancomycin, meropenem, and doxycycline were the most commonly prescribed antibiotics in the DON for resistant *Acinetobacter* cases (data not shown).

Table 4. Antibiotic Prescriptions for Non-Multidrug Resistant *Acinetobacter* Species Infections in the DON, CY 2012

Class	Oral (N = 107)		Intravenous (N = 35)		Antibiotic most frequently prescribed in class (overall)
	Count	Percent	Count	Percent	
Aminoglycosides	4	3.7%	2	5.7%	Gentamicin
Cephalosporins	1	0.9%	6	17.1%	Ceftriaxone
Carbapenems	2	1.9%	4	11.4%	Meropenem
Glycopeptides	4	3.7%	10	28.6%	Vancomycin*
Fluoroquinolones	28	26.2%	3	8.6%	Ofloxacin*
Lincosamides	12	11.2%	1	2.9%	Clindamycin*
Lipopeptides	0	0.0%	1	2.9%	Daptomycin*
Macrolides	7	6.5%	3	8.6%	Azithromycin & Erythromycin
Oxazolidinones	1	0.9%	1	2.9%	Linezolid*
Penicillins and Inhibitors	4	3.7%	3	8.6%	Piperacillin/Tazobactam
Sulfonamides	34	31.8%	0	0.0%	Trimethoprim/Sulphmethoxazole*
Tetracyclines	10	9.3%	1	2.9%	Doxycycline

N = Number of people with at least one antibiotic of that type (oral or intravenous).
*Only antibiotic in class prescribed.
Data are from the HL7 pharmacy databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

Regardless of the route of administration, ofloxacin was the most commonly prescribed antibiotic in the DOD for *Acinetobacter* cases that were not resistant; trimethoprim/sulfamethoxazole was the second-most commonly prescribed antibiotic. Ofloxacin was the most commonly prescribed oral antibiotic and vancomycin was the most commonly prescribed IV antibiotic (Table 5). For DOD isolates with resistance, the most commonly prescribed antibiotic, regardless of the route of administration, was vancomycin (data not shown).

Table 5. Antibiotic Prescriptions for Non-Multidrug Resistant *Acinetobacter* Species Infections in the DOD, CY 2012

Class	Oral (N = 286)		Intravenous (N = 127)		Antibiotic most frequently prescribed in class (overall)
	Count	Percent	Count	Percent	
Aminoglycosides	7	2.4%	13	10.2%	Gentamicin
Cephalosporins	6	2.1%	14	11.0%	Ceftriaxone
Carbapenems	13	4.5%	14	11.0%	Meropenem
Glycopeptides	11	3.8%	34	26.8%	Vancomycin*
Fluoroquinolones	84	29.4%	14	11.0%	Ofloxacin*
Lincosamides	34	11.9%	5	3.9%	Clindamycin*
Lipopeptides	0	0.0%	3	2.4%	Daptomycin*
Macrolides	14	4.9%	4	3.1%	Erythromycin
Oxazolidinones	3	1.0%	2	1.6%	Linezolid*
Penicillins and Inhibitors	5	1.7%	14	11.0%	Piperacillin/Tazobactam
Polymyxins	2	0.7%	0	0.0%	Polymyxin B*
Rifamycins	2	0.7%	1	0.8%	Rifampin*
Sulfonamides	69	24.1%	1	0.8%	Trimethoprim/Sulphmethoxazole*
Tetracyclines	36	12.6%	8	6.3%	Doxycycline

N = Number of people with at least one antibiotic of that type (oral or intravenous).
*Only antibiotic in class prescribed.
Data are from the HL7 pharmacy databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

Table 6 presents an antibiogram of *Acinetobacter* species for DOD and DON beneficiaries. DON *Acinetobacter* species were most susceptible to gentamicin (92.4%) and imipenem (91.2%) and least susceptible to ampicillin (7.0%). DOD *Acinetobacter* species were most susceptible to tetracycline (93.3%) and least susceptible to nitrofurantoin (5.1%).

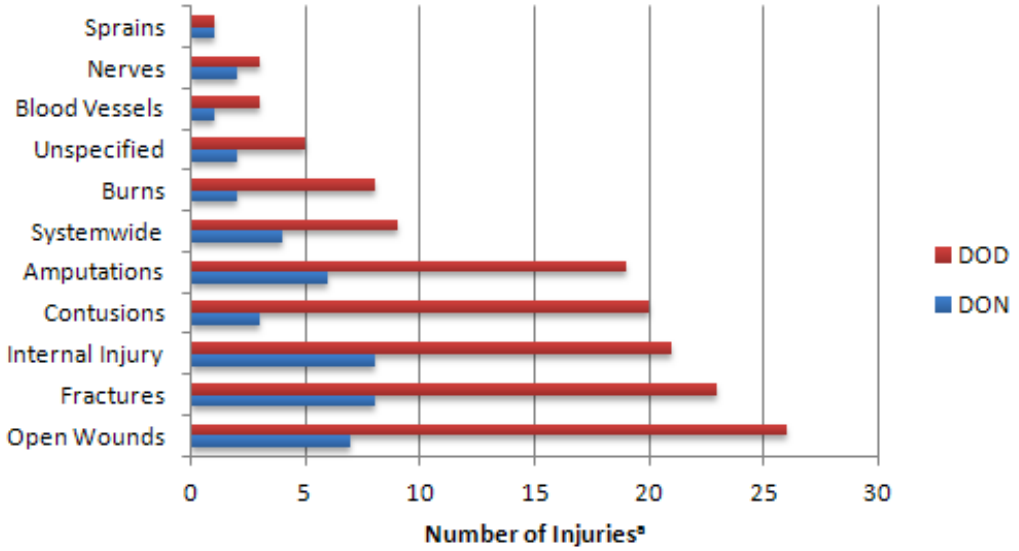
Table 6. Antibiogram of DON and DOD *Acinetobacter* Species Isolates, CY 2012

Population			Amikacin	Amoxacillin/ Clavulanate	Ampicillin	Ampicillin/ Sulbactam	Cefepime	Ceftazidime	Ceftriaxone	Ciprofloxacin	Gentamicin	Imipenem	Levofloxacin	Nitrofurantoin	Piperacillin	Pipperacillin/ Tazobactam	Tetracycline	Tobramycin	Trimethoprim/ Sulfamethoxazole
DON	N = 147	% Susceptible	84.1	--	7.0	87.9	88.5	79.2	28.4	87.8	92.4	91.2	90.0	--	--	--	--	89.8	82.2
		# Tested[a]	44		57	57	104	77	95	123	132	91	70					88	118
DOD	N = 425	% Susceptible	88.1	59.5	11.4	89.7	85.6	72.2	34.0	86.7	89.1	88.0	88.4	5.1	73.4	84.2	93.3	89.0	84.3
		# Tested[a]	168	42	114	185	263	248	247	362	377	250	232	39	109	76	104	292	332

*Only antibiotics with ≥30 isolates tested were reported.
Data are from the HL7 microbiology database.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 28 March 2013.

Injuries associated with *Acinetobacter* in CY 2012 identified from ICD-9-CM diagnosis in encounter records are displayed in Figure 4. In the DON, 19 beneficiaries had an injury associated with an *Acinetobacter* case. Among these 19 beneficiaries, there were 44 associated injuries. In the DOD, 63 beneficiaries had an injury associated with an *Acinetobacter* case. Among these 63 beneficiaries, there were 138 associated injuries. Figure 4 displays the total number of unique injuries for each injury type. The most common types of injuries in the DON were fractures and internal injuries (both, with N = 8, 18.2%), followed by open wounds (N = 7, 15.9%). The most common *Acinetobacter* associated injuries in the DOD were open wounds (N = 26, 18.8%), followed by fractures (N = 23, 16.7%).

Figure 4. Injuries Associated with *Acinetobacter* Species in the DON and DOD, CY 2012

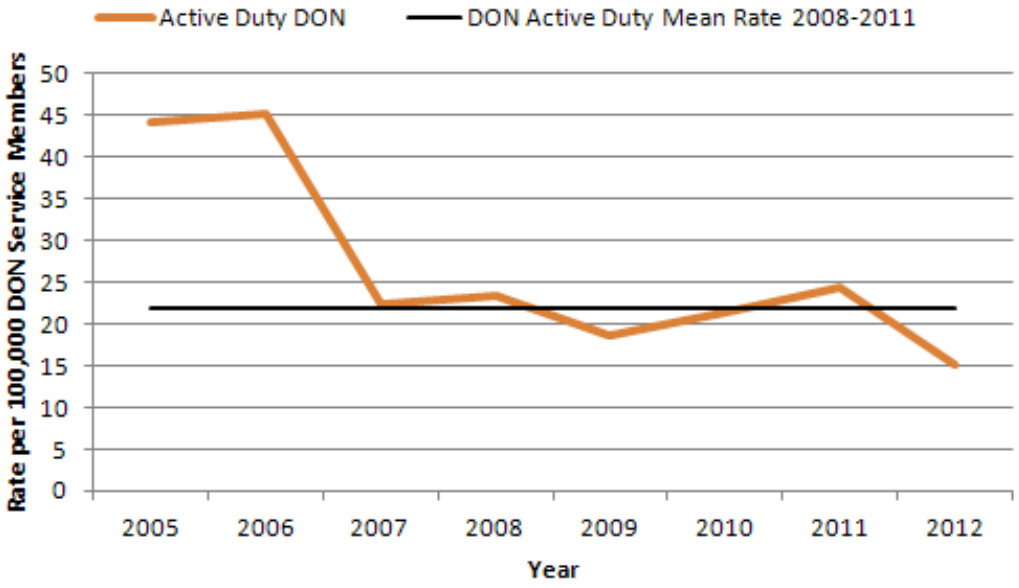


This graph reflects all unique injuries per beneficiary, not the number of beneficiaries with injuries.
[a] DON injuries, N = 19; DOD injuries, N = 44.
Data are from the SIDR and CAPER databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 27 March 2013.

DON Active Duty

Overall for 2012, DON active duty service members had an *Acinetobacter* infection rate of 15.1 per 100,000 active duty service members. The 2012 rate decreased from the 2011 rate and broke the ascending trend seen from 2009-2011. Figure 5 shows a general descending trend in *Acinetobacter* cases among DON active duty service members from 2005-2012 (ρ = -0.69). The 2012 rate is also below the historic mean rate (21.8 per 100,000 active duty service members) and is the lowest seen within this population since enterprise-wide surveillance began in 2005.

Figure 5. *Acinetobacter* Species Infection Incident Rates among Active Duty DON Service Members with Historic Mean Rate, 2005-2012



Data are from the HL7 microbiology database, M2 database, and DMDC active duty roster.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 18 September 2013.

Table 7 presents the demographics of active duty *Acinetobacter* cases in the DON in 2012. The highest rates occurred in women, Marines, service members between the ages of 18 and 24, and OCONUS locations.

Table 7. Demographics of DON Active Duty *Acinetobacter* Species Infections, CY 2012

N = 79	Count	Rate[a]
Gender		
Female	24	35.2
Male	55	12.1
Age Group		
18-24 years	52	22.3
25-34 years	20	10.2
35-44 years	6	7.4
45-64 years	1	6.3
65+ years	0	0.0
Sponsor Service		
Marine Corps	41	20.8
Navy	38	11.7
Location		
CONUS	69	15.5
OCONUS	10	20.5

[a] Rates per 100,000 DON active duty service members.
Data are from the HL7 microbiology and M2 databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

Table 8 displays the clinical characteristics of DON active duty *Acinetobacter* cases. Clinicians primarily identified organisms in the outpatient setting and from non-sterile body sites. Seventeen DON service members with *Acinetobacter* were hospitalized in CY 2012. Six (42.9%) of these hospitalizations were HA cases while the remaining 11 (64.7%) were CO cases. *A. baumannii* caused most cases within active duty DON service members, with 6 MDR cases and 1 XDR case; the remaining 72 cases were not resistant. Surveillance identified no PDR cases.

Table 8. Clinical Description of Active Duty *Acinetobacter* Species Infections in the DON, CY 2012

N = 79	Count	Percent
Encounter Type		
Inpatient	17	21.5%
Outpatient	62	78.5%
Healthcare/Community Associated[a]		
Hospital onset (HO)	0	--
Healthcare associated (HA)	6	35.3%
Community onset (CO)	11	64.7%
Infection Type		
SSTI	30	38.0%
Sterile	2	2.5%
Non-sterile	47	59.5%
Species		
A. baumannii	35	44.3%
A. calcoaceticus-baumannii complex	17	21.5%
A. radioresistens	12	15.2%
A. lwoffii	11	13.9%
A. calcoaceticus	4	5.1%
A. hemolyticus	0	--
A. junii	0	--
A. johnsonii	0	--
A. anitratus	0	--
Antibiotic Resistance		
Multidrug (MDR)	6	7.6%
Extensively drug (XDR)	1	1.3%
Pandrug (PDR)	0	--
None[b]	72	91.1%

[a] Percentage per number of hospitalizations (N = 17).
[b] No level of multidrug-resistance (MDR, XDR, or PDR) was detected.
Data are from the HL7 microbiology, SIDR, and M2 databases.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

DON Recruits

DON recruits had an *Acinetobacter* infection rate of 35.5 per 100,000 recruits in 2012. Table 9 presents the demographics of DON recruit *Acinetobacter* cases. All DON recruit cases occurred in Marines. The highest rates were seen among female recruits and recruits between the ages of 16 and 24.

Table 9. Demographics of Recruit *Acinetobacter* Species Infections in the DON, CY 2012

N = 28	Count	Rate[a]
Gender		
Female	6	46.8
Male	22	33.3
Age Group		
16-24 years	27	38.3
25-34 years	1	21.6
Sponsor Service		
Marine Corps	28	71.7
Navy	0	--

[a] Rates per 100,000 DON recruits.
Data are from the HL7 microbiology database and DMDC active duty roster.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

Table 10 displays the clinical characteristics of DON recruit *Acinetobacter* isolates. Clinicians predominantly collected isolates in the outpatient setting and from non-sterile body sites. *A. baumannii* was the primary species isolated; the data did not report any DON recruit cases with multidrug resistance. One DON recruit with *Acinetobacter* was hospitalized in CY 2012. The hospitalization was identified as a CO case. More than half of the cases identified as non-sterile were tests ordered as wound cultures and could potentially be SSTIs. However, the specimen source and body site of the sample was not specific enough to warrant classifying it as such (data not shown).

Table 10. Clinical Description of DON Recruit *Acinetobacter* Species Infections in the DON, CY 2012

N = 28	Count	Percent
Encounter Type		
Inpatient	1	3.6%
Outpatient	27	96.4%
Healthcare/Community Associated[a]		
Hospital onset (HO)	0	--
Healthcare associated (HA)	0	--
Community onset (CO)	1	100.0%
Infection Type		
Skin and Soft Tissue Infections (SSTI)	6	21.4%
Sterile	0	--
Non-sterile	22	78.6%
Species		
A. baumannii	13	46.4%
A. calcoaceticus-baumannii complex	6	21.4%
A. radioresistens	2	7.1%
A. lwoffii	6	21.4%
A. calcoaceticus	1	3.6%
A. hemolyticus	0	--
A. junii	0	--
A. johnsonii	0	--
A. anitratus	0	--
Antibiotic Resistance		
Multidrug (MDR)	0	--
Extensively drug (XDR)	0	--
Pandrug (PDR)	0	--
None[b]	28	100.0%

[a] Percentage per number of hospitalizations (N = 1).
[b] No level of multidrug-resistance (MDR, XDR, or PDR) was detected.
Data are from the HL7 microbiology database, SIDR database, and DMDC active duty roster.
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 25 March 2013.

Discussion

Overall, cases of *Acinetobacter* species in both the DON and DOD beneficiary populations declined in 2012 and maintained the strong descending trends previously identified in a retrospective report from 2005-2011. The available data indicate that recent *Acinetobacter* cases follow previously observed disease dynamics within the DON and DOD. Monthly infection rates in the DON and DOD display the expected seasonality of *Acinetobacter* species, as the summer and fall months coincide with the highest incidence rates. In CY 2012, the rates fell below the historic mean rate.

Acinetobacter resistance to multiple antibiotics remains low as only 9.3% (N = 14) of DON cases were MDR and 1.3% (N = 2) of DON cases were XDR. DON active duty service members (a portion of whom likely had been deployed) accounted for 6 of the 14 DON MDR cases and 1 of the 2 XDR cases. In a concurrent analysis of CY 2012 deployment-related *Acinetobacter* cases in the US Central Command (CENTCOM), the EDC found that 31.0% of DON active duty service member cases who had been deployed were MDR (N = 13) and 2.4% were XDR (N = 1). Though these counts are too low to make any statistical conclusions, proportionately, deployment-related cases tend to be more resistant than active duty non-deployment related cases, suggesting that resistant DON active duty *Acinetobacter* cases outside of the deployed population are less common.

The number of injuries associated with *Acinetobacter* cases remained relatively low in the DOD among all populations. The percentage of injuries in 2012 (14.1%) dropped from the percentage identified in the retrospective report from 2005-2011 (29.0%). The two types of injuries (open wounds and fractures) most commonly identified in the retrospective report remained the same. Possible reasons for this reduction include a change in operation tempo in CENTCOM and/or improved implementation of safety measures.

Climate and seasonality are both important factors in the propagation of *Acinetobacter*; which prefers hot-humid environments.[3,5-7] The data reflect this characteristic in the overall DOD beneficiary population. DOD and DON rates peak during the summer months (June-August) and begin to decrease in the fall (September-November) with the lowest rates in winter and spring (December-May). The CONUS rates by climatic region clearly show that regions of higher humidity have the highest rates of infection. Overall, *Acinetobacter* cases in the DOD align with the normal variability of the organism and follow typical geographical and seasonal patterns.

As historically observed among DOD beneficiaries, OCONUS *Acinetobacter* cases occur at a higher rate than CONUS cases. Further analysis of OCONUS cases revealed that in 2012 the DOD primarily encountered cases in Germany among active duty personnel and their family members. Endemic and epidemic outbreaks have been reported outside of the US for the past few decades, particularly throughout Europe, including Germany, where the DOD has several bases and MTFs.[2,6] It is therefore not surprising that the rate of OCONUS cases is higher than that observed within the US.

Historically, there is an overall descending trend of *Acinetobacter* cases in DON active duty service members from 2005-2012. Although there was an increase in 2012, it is only slight given that the overall trend was still descending. The descending trend is likely the reflection of a better understanding of the epidemiology of the organism over the last seven years (primarily among deployed service members), the development of standard infection control and treatment practices of combat-related infections, and potentially a change in operational tempo of OIF/OEF.

Active duty DON service members between the ages of 18 and 24 had a high infection rate compared to other active duty age groups. The rate was 46% higher than the next highest age group, 25-34. It is presumed that younger service members likely have more physically demanding responsibilities and greater exposures to *Acinetobacter* than their older members, thus contributing to the higher rates of infection seen in this population.

Female active duty DON service members experienced an infection rate of 35.2 per 100,000 service members, a rate about three times higher than male active duty DON service members. Though the infection rate for female active duty service members is high, the population size is so small that it is difficult to conclude that there is a significantly larger problem among females than males.

All DON recruit *Acinetobacter* cases occurred in Marine recruits between the ages of 16 and 24. Both Marine Corps Recruit Depots (MCRDs) are located in warm areas of the US (South Carolina and southern California), which present conditions favorable to the growth of *Acinetobacter* species. The Naval Training Center is located in Great Lakes, Illinois, which experiences, on average, a cooler and less humid climate than the MCRDs and may be a reason why the DON identified no cases of *Acinetobacter* among Naval recruits. No recruit cases were resistant, indicating that resistance is not a current concern in this population. Additionally, the absence of *Acinetobacter* infections in Navy recruits in 2012 does not signify an absence of risk for acquiring an *Acinetobacter* infection. Therefore, monitoring of the recruit population should continue for any emergent infections and drug resistance.

This annual report summarized *Acinetobacter* species infections in the DON and DOD beneficiary populations in 2012 and reported changes from previously identified trends. Continued surveillance of *Acinetobacter* infections is necessary to monitor any changes in burden and drug resistance. It is important to monitor these organisms as they can cause invasive and hospital-associated infections, are adept at acquiring resistance determinants, and are currently organisms of concern for deployment-related infections.

Limitations

HL7 formatted data are generated within the CHCS at fixed MTFs. Microbiology testing results only list the organism(s) that were identified, not the intended tests (e.g., if a physician suspects an organism different from the one that was identified, the record will not show the organism that the physician suspected). Microbiology data are used to identify laboratory confirmed cases of illness. However, the microbiology data does not capture cases in which a physician chose to treat presumptively without laboratory confirmation. Clinical practices also vary among providers and facilities. For example, some clinicians may not perform cultures for confirmatory tests for patients with influenza-like illness symptoms or for patients with superficial infections who are treated presumptively. Therefore, the isolate counts here are likely an underestimate of the actual burden of *Acinetobacter* species in the DOD.

The use of microbiology data for analysis of antibiotic resistance is limited by the practice of cascade reporting, where antibiotic sensitivity results are conditionally reported to CHCS to guide treatment decisions. DOD MTFs practice cascade reporting to varying degrees. Furthermore, not all laboratories in the DOD operate under the same version of CLSI guidelines. As a result, certain facilities use guidelines with outdated antibiotic susceptibility breakpoints and may incorrectly report some susceptibilities. Thus, the EDC cannot project a complete picture of the susceptibility patterns for *Acinetobacter* species isolates and the presumption of reduced susceptibility is applied to all antibiotics in a class if an isolate is shown to be resistant to that class.

Rate calculations based on climatic region is limited by the availability of denominators. To provide meaningful rates, climate regions were grouped around state lines, which do not necessarily align with the true climate patterns within the US. Each state was grouped into the climatic region that was experienced by the majority of the state, thus slightly altering the true climatic pattern within the US. The climatic rates and percent changes therefore slightly vary from the true climatic rate. However, these modifications were few and the variation from the true rate is therefore minimal. These rates were a reflection of burden within a climatic region, not exposure. Deployment-related cases were not removed from the calculations and affect the ability to relate the reported rates to exposure.

A SIDR is created at discharge or transfer from an inpatient MTF for all TRICARE beneficiaries. For active duty personnel, this occurs for non-military medical treatment facility discharges as well. Patient encounter records depend on correct ICD-9-CM coding practices. Data for medical surveillance are considered provisional and medical case counts may change if the discharge record is edited after the patient is discharged from the MTF. As this report presents an annual summary and several months were allotted in the new year to account for possible data lag and record corrections, it can be presumed with relative certainty that the records identified are the final and complete records for an inpatient encounter; however, the possibility does exist that records still may be modified, thereby altering the case counts. SIDR data are also limited in that it is difficult to associate a specific microbiology record with an anatomical location of an injury, particularly when a patient has multiple injuries identified in the record. This makes it

difficult to definitively link an injury to a specific infection difficult. Ambulatory records are created at the close out of an outpatient medical encounter at DOD MTFs for all TRICARE beneficiaries. As with SIDRs, analysis of ambulatory records is contingent on correct ICD-9-CM coding practices and are considered provisional where medical case counts may change if the record is edited after the initial close out of the encounter.

DMDC stores data on service members using multiple rosters. The active duty roster contains all active duty service members and should include activated reservists. However, anecdotal analyses conducted by the EDC suggest that not all activated reservists are listed on the active duty roster. Additionally, DMDC records are created only once a month.. If a reservist was activated after his or her record was created, the record would not reflect the change in status until the following month. While this is the exception and not the standard for DMDC records, identification of active duty service members is incomplete as a result.

Providers may not have prescribed the antibiotics in response to the *Acinetobacter* infection. It is possible that antibiotics dispensed around the same timeframe of *Acinetobacter* culture reflects treatment for other reasons. Additionally, cases where a physician chose to treat presumptively were not captured because HL7 microbiology records were used to define cases. Because only *Acinetobacter* species isolates were identified, this analysis did not afford the opportunity to consider if patients had a concurrent infection with another organism for which a prescribed antibiotic could have alternatively been intended. However, the majority of antibiotics prescribed were antibiotics that could be used in the treatment of an *Acinetobacter* infection, leading one to believe that that isolate was the intended target for the antibiotic prescription.

All the above mentioned databases are limited in that they do not include data from purchased care, shipboard facilities, battalion aid stations, or in-theater facilities. Therefore, these results are only an estimate of the true *Acinetobacter* species infection burden in the DON and DOD. In addition, this report did not consider deployment exposure and the proportion of cases imported from outside the treating MTF's geographic area is unknown.

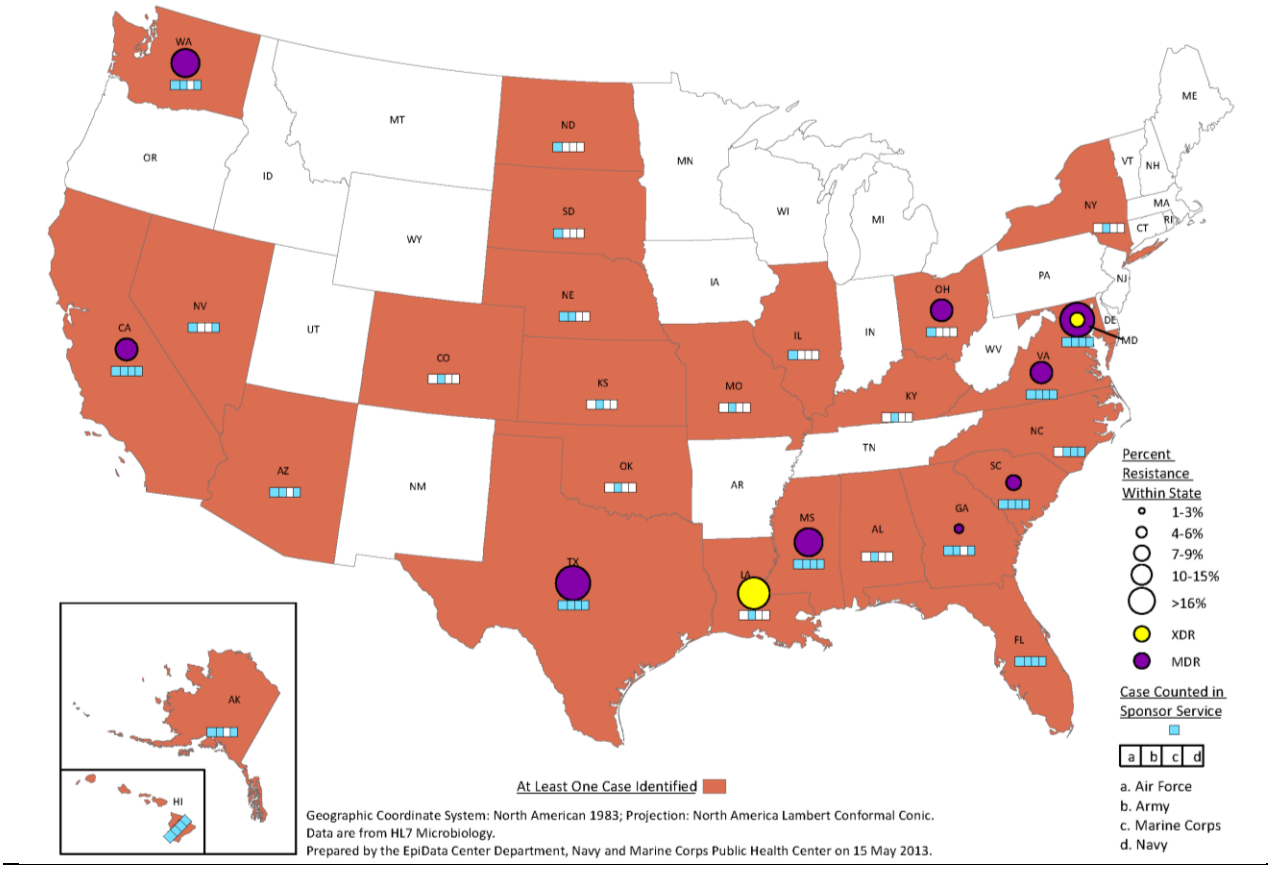
Appendix

Table A11. Antimicrobial Categories Used to Identify the Level of Multidrug-Resistance in *Acinetobacter* Species[a]

Animicrobial Category	Antibiotic
Aminoglycosides	Gentamicin
	Tobramycin
	Amikacin
	Netilmicin
Antipseudomonal carbapenems	Imipenem
	Meropenem
	Doripenem
Antipseudomonal fluoroquinolones	Ciprofloxacin
	Levofloxacin
Antipseudomonal penicillins & β-lactamase inhibitors	Piperacillin/Tazobactam
	Ticarcillin/Clavulanic acid
Extended-spectrum cephalosporins	Cefotaxime
	Ceftriaxone
	Ceftazidime
	Cefepime
Folate pathway inhibitors	Trimethoprim/Sulfamethoxazole
Penicillins & β-lactamase inhibitors	Ampicillin/Sulbactam
Polymyxins	Colistin
	Polymyxin B
Tetracyclines	Tetracycline
	Doxycycline
	Minocycline

Multidrug-resistant (MDR): non-susceptible to ≥1 antibiotic in ≥3 antimicrobial categories.
Extensively drug-resistant (XDR): non-susceptible to ≥1 antibiotic in all but 2 antimicrobial categories.
Pandrug-resistant (PDR): non-susceptible to all antibiotics listed.
[a] Table modified from Magiorakos et al., 2012[14]
Prepared by the EpiData Center Department, Navy and Marine Corps Public Health Center on 20 February 2013.

Figure A6. Distribution of All *Acinetobacter* Cases and Percentage of Multidrug-Resistant Cases in the DOD, CY 2012



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Acronym/Abbreviation List

Acronym/Abbreviation	Definition
ABC	*A. baumannii-calcoaceticus* complex
CAPER	Comprehensive Ambulatory Professional Encounter Record
CENTCOM	United States Central Command
CHCS	Composite Health Care System
CLSI	Clinical and Laboratory Standards Institute
CO	Community-onset
CONUS	Continental United States
CY	Calendar year
DMDC	Defense Manpower Data Center
DMIS ID	Defense Medical Information System Identification number
DOD	United States Department of Defense
DOE	United States Department of Energy
DON	United States Department of the Navy
HA	Healthcare-associated
HL7	Health Level 7
HO	Hospital-onset
ICD-9-CM	International Classification of Diseases, Ninth Revision, Clinical Modification
IV	Intravenous
M2	MHS Mart
MCRD	Marine Corp Recruit Depot
MDR	Multidrug-resistant
MEPRS	Medical Expense and Performance Reporting System
MHS	Military Health System
MTF	Military treatment facility
OCONUS	Outside of the continental United States
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
PDR	Pandrug-resistant
Q	Quarter (yearly)
SIDR	Standard Inpatient Data Record
SSTI	Skin and soft tissue infection
US	United States
WHO	World Health Organization
XDR	Extensively drug-resistant